Food and Agriculture
Organization of the
United Nations

IUCN SSC
Human-Wildlife
Conflict & Coexistence
SPECIALIST GROUP

HUMAN-WILDLIFE CONFLICT & COEXISTENCE
/ CASE STUDIES

DEVELOPING AND EVALUATING A BEEHIVE FENCE DETERRENT THROUGH STAKEHOLDER INVOLVEMENT

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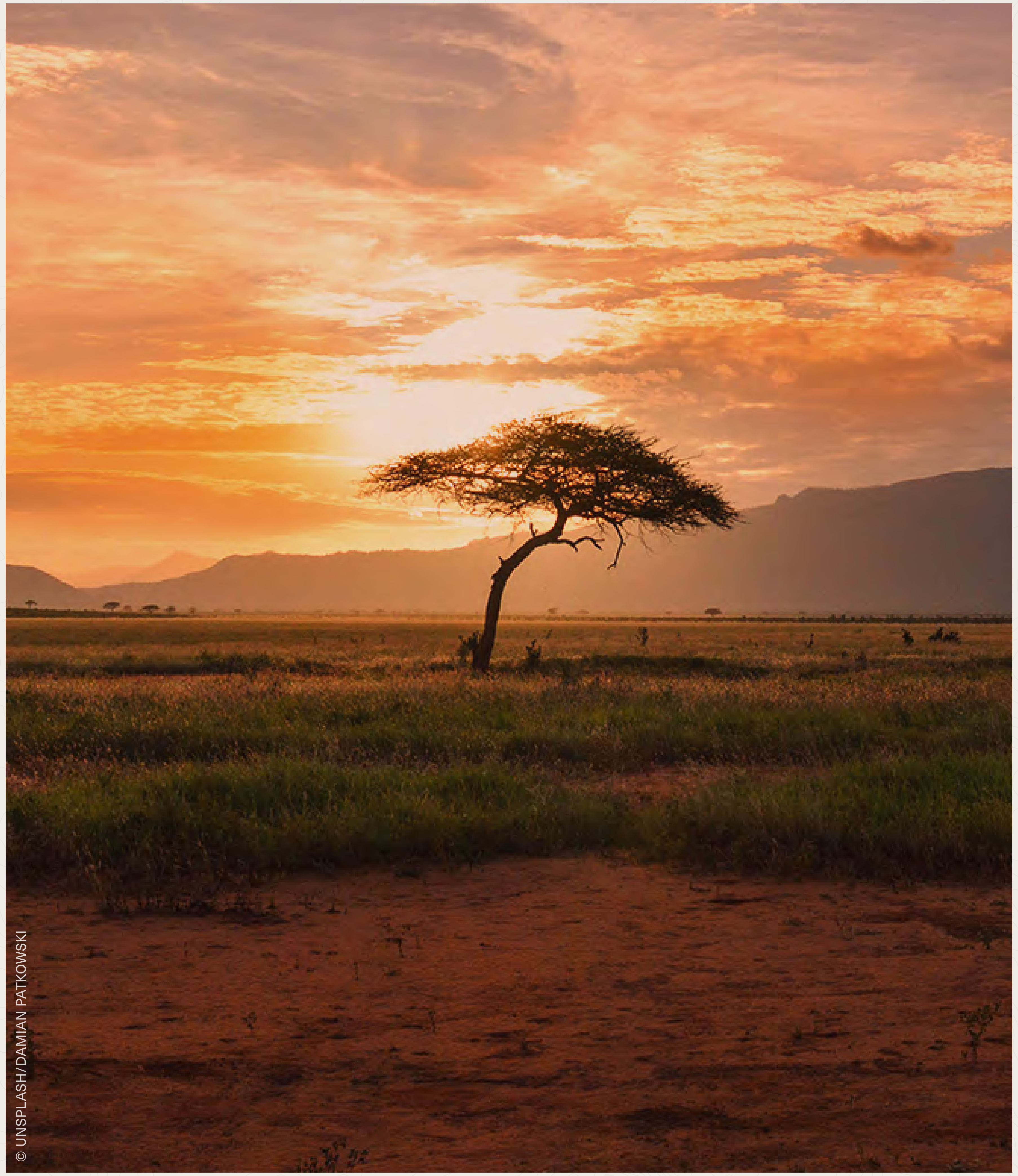
INTRODUCTION

The Elephants and Bees Project is part of Save the Elephants' Human-Elephant Coexistence Programme, based in Sagalla, next to Tsavo East National Park in southern Kenya.

> **THE PROJECT USES THE NATURAL AVOIDANCE OF AFRICAN ELEPHANTS *LOXODONTA AFRICANA* TO AFRICAN HONEY BEES *APIS MELLIFERA SCUTELLATA* TO DETER ELEPHANTS FROM VILLAGES AND FARMERS' FIELDS USING BEEHIVE FENCES.**

This case study highlights the process undertaken since 2001 to understand the effect honey bees had on elephants and to develop, evaluate and implement beehive fences at several sites in Kenya, from initial research-based studies on the effect of bees on elephants to the establishment of the Elephants and Bees Project.

KEY INSIGHTS & LESSONS LEARNT
ON PAGE 10



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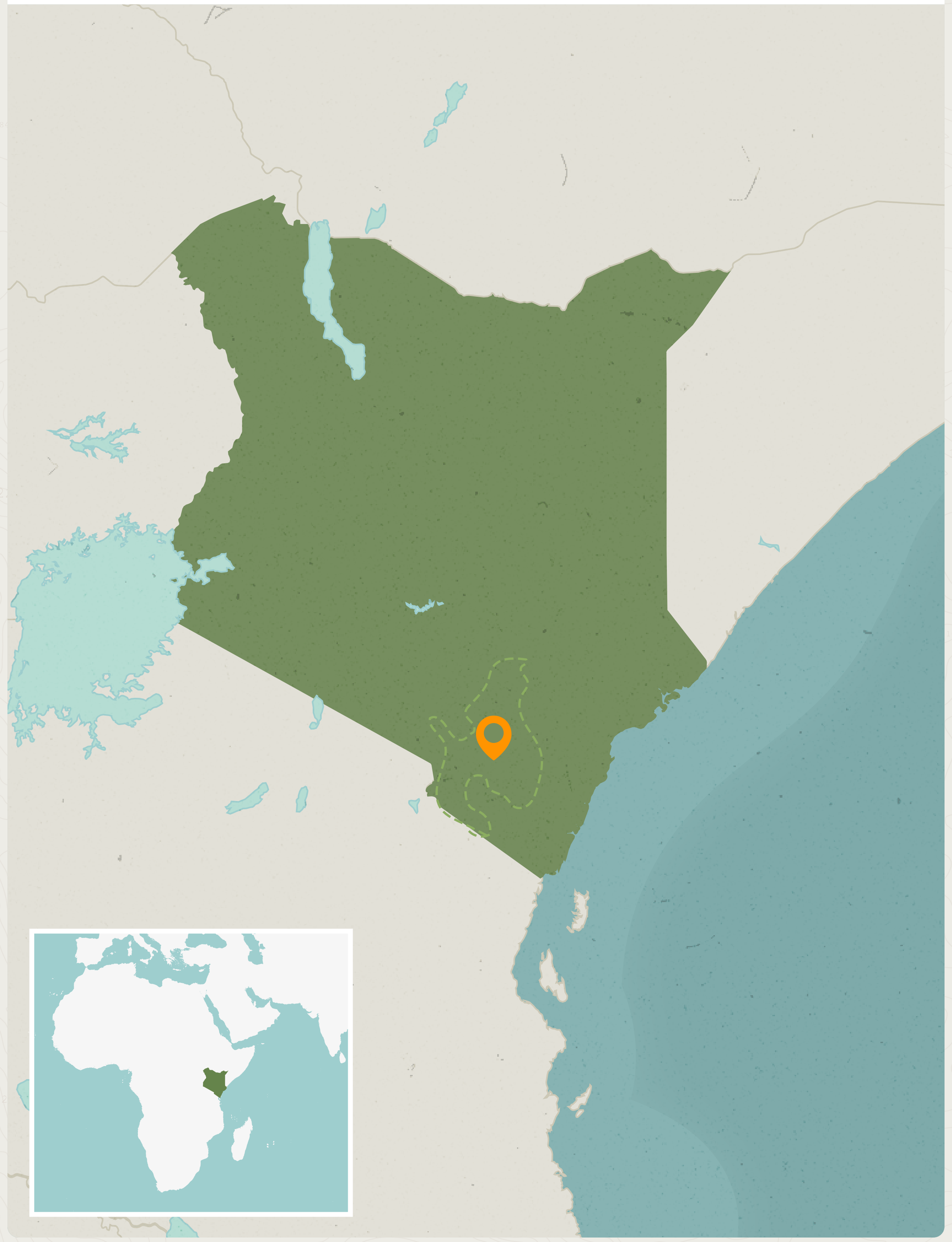
SAGALLA

NEXT TO TSAVO EAST NATIONAL PARK

**SAGALLA,
KENYA**



Source: Free Vector Maps modified to comply with UN, 2020

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UNDERSTANDING ELEPHANTS' REACTIONS TO BEES

In 2001, during interviews with Maasai herders and Samburu honey hunters, two unique anecdotes were reported to researchers at Save the Elephants that a) elephants had been seen being chased by disturbed bees over long distances, one observation during moonlight, and b) elephants would not forage on trees hung with beehives. This local knowledge was then tested experimentally on Mpala Ranch in 2002 when it was found that acacia trees hung with protective beehives incurred less damage from elephants than trees without. These findings initiated a series of in depth scientific investigations of elephant behaviour by the team to determine how they respond to threats, in this case, bees. The playback of bee noises in a controlled study in Samburu National Reserve in 2007 reinforced that the elephants were responding to bees by quickly moving from the source of the noise.

THE RESEARCHERS FROM SAVE THE ELEPHANTS TRANSITIONED FROM RESEARCH PURELY FOCUSED ON COGNITION IN ELEPHANTS TO A PROJECT THAT COULD PROVIDE SOCIAL BENEFITS FOR THE COMMUNITIES LIVING WITH ELEPHANTS, AND A BEEHIVE FENCE DESIGN WAS DEVELOPED.

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DESIGNING, DEVELOPING AND TESTING THE BEEHIVE FENCE

To determine whether a beehive fence could be used to deter elephants, a farming community with active beekeepers in Ex-Erok, a small-scale farming area, in Laikipia was identified who was interested in trialling an intervention and had previously been involved in other trials of elephant deterrents. In 2007, pretrial interviews were conducted with farmers who confirmed that the area was affected by many crop-raiding incidents. In the development phase of the trial, participatory activities were undertaken with the farmers to identify critical dates around planting, harvesting, rainy and dry seasons and to identify when crop-raiding incidents were at their highest, identifying August-September as the best trial period. To determine the best location for a beehive fence, the farmers created a map of their farming area, identifying households, land features, and elephant movement patterns through the community. This mapping exercise identified the vulnerable farms in the region, with the farmers choosing two farms for the trial to take place, one treated with a beehive fence and one to act as a control.

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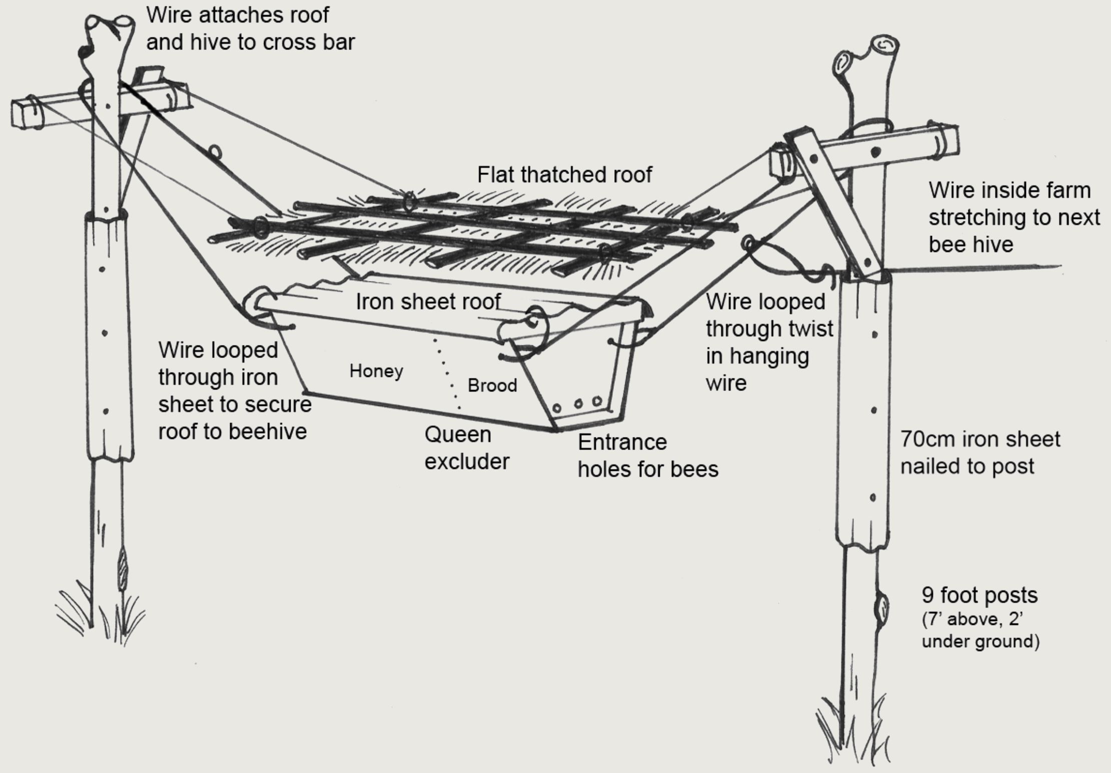
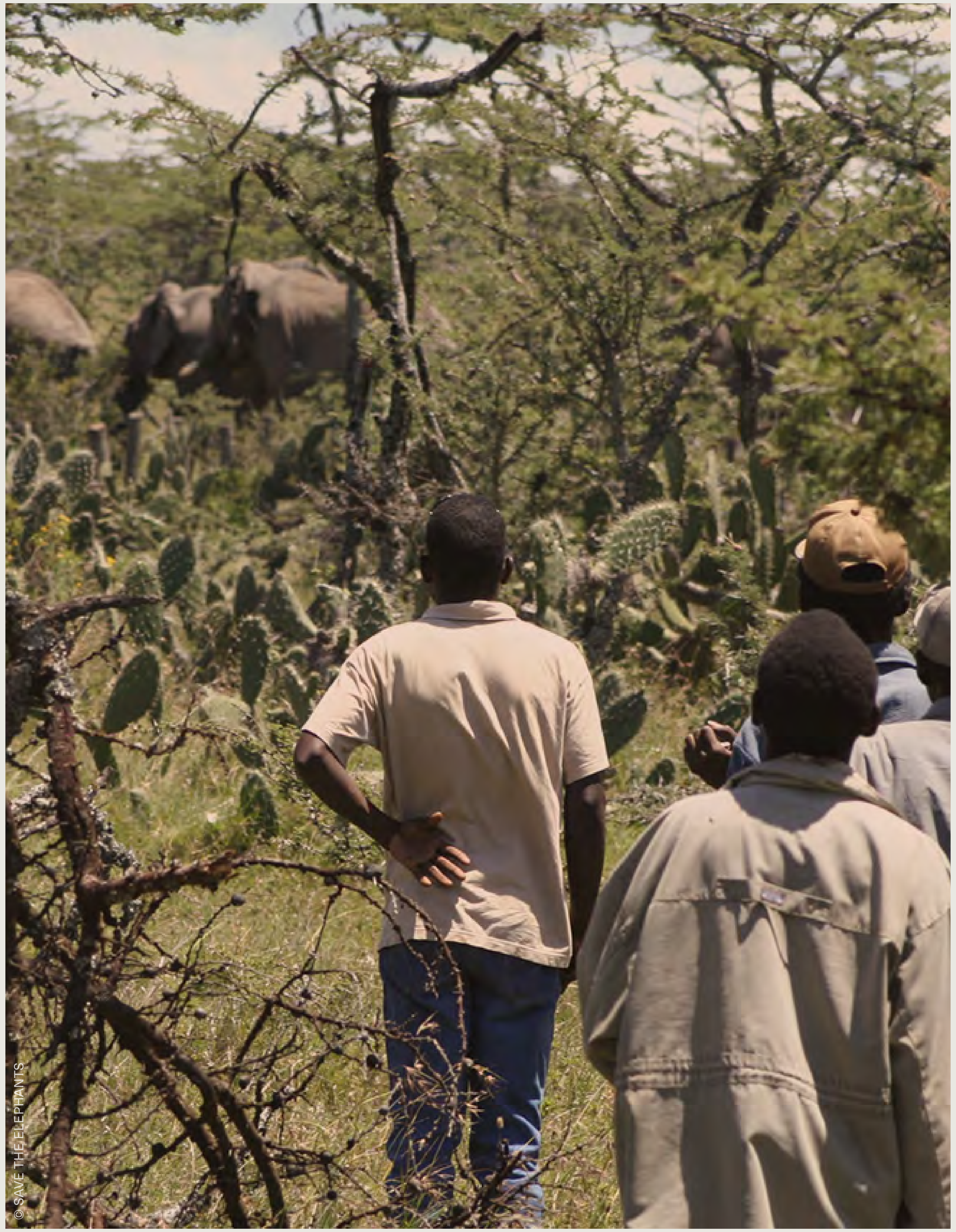
A technical design for how the beehive fence could be constructed using traditional and old log beehives was introduced to the community by Save the Elephants.

> THIS DESIGN WAS MODIFIED THROUGH DISCUSSIONS WITH THE FARMERS TO INCORPORATE KEY ADJUSTMENTS FROM THEM.

Two indicators were identified through conversations with the farmers to help the community decide if the fence was successful. These were i) whether the beehive fence would keep elephants away from the field and ii) whether the fence would be cheap and easy to maintain. Save the Elephants identified additional indicators to determine success, such as monitoring the movement of elephants around the fences, recording positive responses from the farmers and establishing realistic set-up costs. The farmers in the two farms were tasked with recording crop-raiding incidences in their fields with basic datasheets.

Despite the hives not actively containing bees during the trial, the farm with the beehive fence received fewer raids by elephants during that period. When elephants did enter fields, they did so in smaller numbers. The farmers in the region responded positively to the beehive fence design, enhanced by the participant ownership of the trial. This trial provided the initial data to show that a beehive fence could deter elephants and was supported by the farmers tasked with operating it. However, following the trial, the Laikipia electric fence was constructed by other parties in the area closing the elephant's route into the Ex-Erok community. Therefore, the community no longer required the use of beehive fences.


Wire attaches roof and hive to cross bar
Flat thatched roof
Wire inside farm stretching to next bee hive
Iron sheet roof
Wire looped through twist in hanging wire
Wire looped through iron sheet to secure roof to beehive
Honey
Brood
Queen excluder
Entrance holes for bees
70cm iron sheet nailed to post
9 foot posts (7' above, 2' under ground)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REFINING AND FURTHER TESTING THE BEEHIVE FENCE

Save the Elephants initiated the next stage of trialling the beehive fence concept in two Turkana sub-villages of Ngara Mara, Kenya, between 2008 and 2010. The two sub-villages were known for conducting poaching activities and were not supported by local NGOs. Initially, many meetings were held in these sub-villages to explain the purpose of the activity and receive an agreement for the work to be conducted. Similar actions were performed as completed in the Ex-Erok community to understand the situation, including mapping elephant movement through the community with the farmers and understanding the farmer's activity patterns.

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Although the beehive fence design developed in the previous trial appeared effective, it took a long time to build and required many resources.

THROUGH DISCUSSIONS WITH THE FARMERS ABOUT THESE CONCERNS, THE FARMERS CAME UP WITH AN INNOVATIVE ADJUSTMENT TO THE HANGING ROOF DESIGN TO IMPROVE THE STRUCTURE, USING LOCALLY AVAILABLE MATERIAL AND ENSURING THE CONSTRUCTION WAS SIGNIFICANTLY QUICKER.

The design incorporated Kenyan Top Bar hives. Having identified 34 of the farms most entered by elephants, beehive fences were constructed along 50 percent of them. The remaining 50 percent were treated as control farms, protected only by traditional thorn bush barriers. During the trial, of the 32 events where elephants could enter the farms, only one occurred via the beehive fence. During this trial, the volume of honey produced in the hives of the fence was first recorded, and despite poor climatic conditions during the trial, 106 kg of honey was produced.

IDENTIFYING BENEFICIARIES

In 2009, the researchers were invited to Mwakoma village in Sagalla, Kenya, as farmers suffered from repeat crop-raiding events. The community selected two farmers worst affected by elephants. Beehive fences were constructed using primarily Kenyan Top Bar beehives. Initial data showed that the fences had been successful, with only one elephant breaking the beehive fence, despite 52 elephants visiting the farms over ten months. Having determined that the beehive fences under the circumstances tested were successful at deterring elephants, the quick and visible results of seeing elephants turning away from the fence resulted in high demand from farmers for a fence. Demand for the beehive fences could not be met, and the project called a meeting with the community. These resource limitations were explained to the community, and it was noted that the project could only support the most impacted or vulnerable community members. Farmers were requested to list the ten farmers they felt most needed support from building a beehive fence. Once the farmer's names were tallied, the project visited the ten farmers with the most votes, often finding that the farmer, in some cases, was not always exposed most frequently to elephant impacts but certainly would be vulnerable to any damage by elephants.

ELEPHANT friendly HONEY
TSAVO BLOSSOM
RAW ORGANIC UNHEATED
KAKONGO'S BEEHIVE FENCE

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Having identified suitable farmers for beehive fences, the farmers and project staff would construct the hives and build the fence. It was noted at this site that there was a disconnect between the community and the Kenyan Wildlife Service (KWS), with very little communication between the stakeholders. In some instances, when scaring elephants from the region, KWS wildlife officers would accidentally drive over fields causing further damage. The project tried to act as an intermediary and facilitated that the KWS donated 30 hives to the community, which helped improve the relations. Selected farmers received training in maintaining the fences and harvesting honey and agreed to be involved in the research project, collecting data and showed a willingness to host camera traps on their farms to learn more about the behaviour of elephants approaching the fences.

> **RESPONSIBILITY FOR THE BEEHIVES WAS HANDED TO THE FARMER, BUT THE PROJECT SUPPORTED THE DATA COLLECTION AND HARVESTING OF THE HONEY.**

The project also secured a market for the honey produced under the trademarked label of "Elephant-Friendly Honey".

OUTCOMES

Success was determined at the various sites mentioned above where the beehive fences had been implemented through several indicators, from the farmer's perception of their ability to deter elephants with beehive fences to data indicating that the fence had actively deterred elephants.

IN THE MOST COMPREHENSIVE TRIAL IN MWAKOMA VILLAGE IN SAGALLA, DATA FROM 2012 TO 2015 SHOWED THAT OF THE 253 ELEPHANTS THAT APPROACHED FARMS WITH A BEEHIVE FENCE, 80 PERCENT WERE DETERRED, AND FARMERS WITH A BEEHIVE FENCE WERE MORE CONFIDENT OF THEIR ABILITY TO DEAL WITH ELEPHANTS THAN FARMERS WITHOUT.

The beehive fences do not solely benefit farmers by deterring elephants. Farmers benefit financially from the sale of honey. The project has estimated that in a good season a beehive fence with twelve hives could create a potential income of USD 245 per harvest season.

The Elephants and Bees Research Centre is now based in the Mwakoma village. A honey processing room and community training centre have been established to support other Kenya sites.

ELEPHANT friendly HONEY
TSAVO BLOSSOM
ORGANIC RAW UNHEATED
BEEHIVE FENCE HONEY
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KEY INSIGHTS & LESSONS LEARNT

01 TRANSPARENCY

The project always ensured that when engaging with the communities, they were aware that the activity involved trialling the fence in the initial stages as they were not sure whether it would work or not.

02 CREATING AN EVIDENCE BASE

Before actively promoting beehive fences, the project ensured that an evidence base for the beehive fence had been made to determine its functional efficacy while understanding the impacts in the region by elephants and the farmers' activity patterns meant it could be implemented correctly.

03 ADAPTABILITY

As the project progressed, challenges would develop that could not have been identified when the activity was initiated, particularly around the cultural dimensions of the community. This required the project to be flexible and open to adapting to account for these challenges and holding discussions with the community regarding how best to adapt.

04 LOCAL KNOWLEDGE

During all the trials, the farmers were involved in improving the design and developing the beehive fence, often providing crucial contributions to ensure the fence was appropriate for the local context and creating a feeling of ownership.

05 LOCALLY AVAILABLE MATERIALS

Despite initially constructing the first beehive fences with material sourced from outside the community, locally sourced material was identified that was more accessible to community members by modifying the design with farmers including the coppicing of *Commiphora spp*. trees to use as posts that re-grew as trees around the farm further strengthening the bio-fence protection.

06 QUICK RESULTS

Once developed and tested, the beehive fence often showed immediate results for farmers implementing them. Farmers observed the elephants being deterred by the fence when they approached it, even if empty of bees after installation, creating demand.

07 INDIVIDUALS DETERMINE SUCCESS

The project worked with farmers who actively wanted to implement beehive fences. This was important as beehive fences require regular maintenance and they need the correct ecological components to be successful. If farmers were seen to be inactive with poor maintenance over several seasons, the community farmers group move the beehive fence to a family who is keen to manage the hives properly. Such decisions were left to the community group, thus creating a sense of communal ownership or peer pressure to make the project successful.

08 WIDER LANDSCAPE CHANGES

Some changes in the broader landscape can affect the situation that is not in the project's control. During one trial, the construction of a railway line between the national park and communities meant that elephants would often get trapped on the community side, putting more significant pressure on the fences and community. The beehives are also vulnerable to the changes in rainfall, with hives losing their colonies during drought periods which are difficult to predict.

FURTHER INFORMATION

- Save the Elephants website
- Elephants and Bees Project
- Save the Elephants: Scientific publications
- Save the Elephants: Video library
- TED Women: How bees can keep the peace between elephants and humans
- The Department of Biology, Oxford University

ACKNOWLEDGEMENTS

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ABOUT THE CASE STUDIES

The **Food and Agriculture Organisation** (FAO) of the United Nations and the **IUCN SSC Human-Wildlife Conflict & Coexistence Specialist Group** (HWCCSG) have jointly developed a set of case studies with the aim of covering the process projects have taken to manage various aspects of a human-wildlife conflict & coexistence situation. This case study is one of many that will be used to illustrate key components of the **IUCN SSC Guidelines on Human-Wildlife Conflict & Coexistence**. The published case studies can be found in the **Human-Wildlife Conflict & Coexistence Library**.

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